



Construction Work Plan  
Sheet Pile Repair  
Metal Bank Cottman Avenue  
Superfund Site

On behalf of:  
**Cottman Avenue PRP Group**

Prepared by:  
**ENVIRON International Corporation**  
Boston, Massachusetts

Date:  
**April 2015**

Project Number:  
**33-34792G**

# Contents

	Page
1 <b>Objective</b>	<b>1</b>
2 <b>Background</b>	<b>1</b>
3 <b>Current Sheet Pile Condition</b>	<b>2</b>
4 <b>Required Sheet Pile Repairs</b>	<b>4</b>
5 <b>Closing</b>	<b>5</b>

## List of Appendices

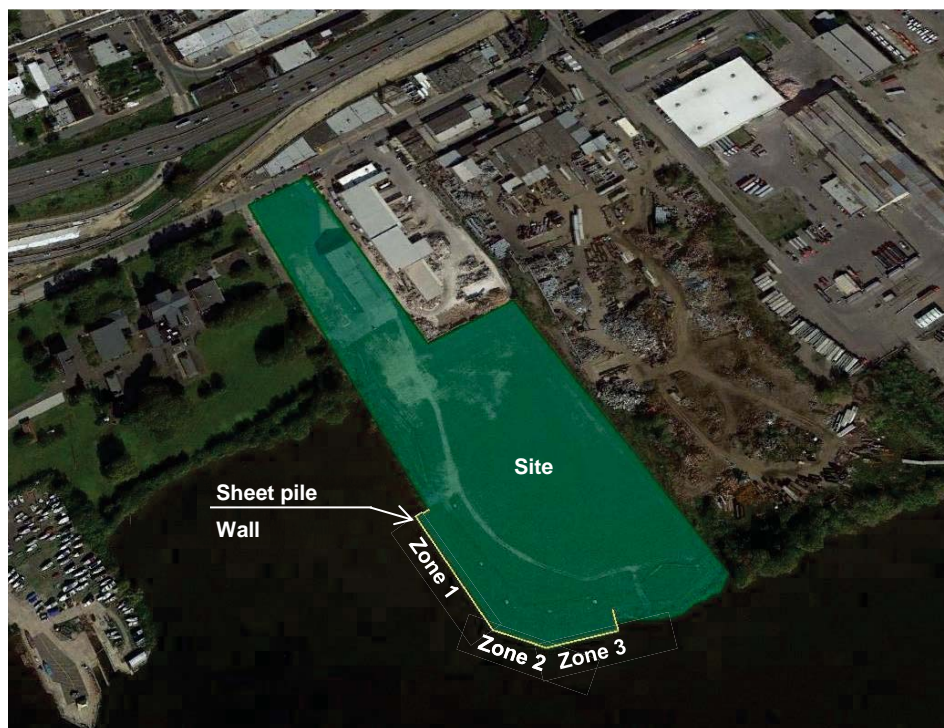
Appendix A:    Technical Specifications and Design Drawings

# 1 Objective

The objective of this document is to provide the framework and background to support the plans and specifications, including the notes and drawings included in Appendix A as well as any subsequent Contractor submittals. **In the event that information presented in the body of this document conflicts with information provided in Appendix A, the information presented in Appendix A shall take precedence.**

## 2 Background

Installation of the sheet pile wall at the Metal Bank Cottman Avenue Superfund Site (“the Site”) was completed in 2010, as a component of the final remedy selected for the Site. The primary purpose of the sheet pile wall is to prevent the erosion and potential migration of upland soils into the Delaware River and surrounding mudflats. A site plan showing the location of the sheet pile in relation to the Site is provided below.



Following the installation of the sheet pile, routine monitoring has been performed to evaluate the physical and structural integrity of the sheet pile. Signs of movement in the sheet pile were first observed during a site inspection in 2012. Subsequent inspections and evaluations have determined that certain components of the sheet pile are failing and that repairs are needed. This work plan describes the current sheet pile condition and presents the plans and specifications of the required sheet pile repairs.

### 3 Current Sheet Pile Condition

Sheet pile inspections were performed in November 2012, April 2014, and March 2015 by RA Consultants (RAC), an independent geotechnical engineer retained by the Cottman Avenue PRP Group (the "Group"). RAC made the following observations of current sheet pile conditions:

- The north side of Zone 1 shows movement of the sheet pile wall system. The epoxy coating on the face of the wale has been scraped and removed providing evidence that the tieback plates have moved relative to the wale.



In addition, the wale and sheet pile wall appear to be bowing with the apex of the bow at the bolted connection and there appears to be additional movement of the tieback plates relative to the wale.



- Cracks and separation of the wale were observed where the sheet pile wall changes direction (turns east) in Zone 2. The miter cut and joint where the wales meet at the corner was cracked. The cracks appear to be stress (tension) cracks. The wale cracked (failed) at this location due to movement of the wall toward the river.



- The west side of Zone 3 shows signs of movement of the sheet pile wall system. The epoxy coating on the face of the wale has been scraped and removed providing evidence that the plates have moved relative to the wale.

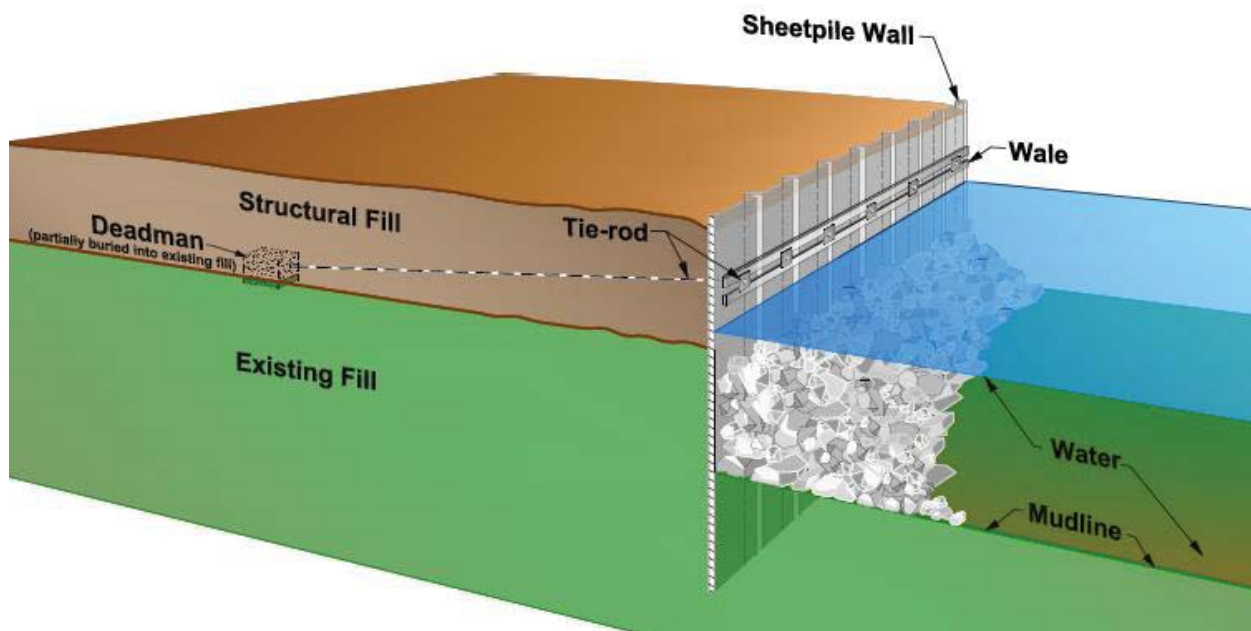




## 4 Required Sheet Pile Repairs

This section provides an overview of the required sheet pile repairs on a conceptual level only. The design drawings, notes, and specifications included in Appendix A, and the various required Contractor submittals detailed on Figure 1 of Appendix A, will be the documents that provide the needed level of detail to construct the repair.

The approach consists of two components: (1) to place rip rap on the river side of the sheet pile wall to provide additional support, and (2), to repair the portions of the wale that have failed. These repairs will address both the structural and global stability of the sheet pile wall under low water conditions and eliminate further movement of the wall. A schematic of the proposed repairs is shown below, though the detailed approach and means and methods for the required repairs and rip rap placement are to be determined by the contractor.



We expect that prior to commencement of the work, the contractor will prepare a health and safety plan and conduct a series of site preparation activities, including (but not limited to):

- Establishing a secure work site using appropriate fencing
- Temporarily remove fencing near the sheet pile wall, as needed to perform the work
- Prepare staging areas for equipment and materials
- Implement vegetation protection measures
- Measure and verify pertinent dimensions in the field

- Mobilize equipment
- Implement turbidity control measures

We expect that the work itself will consist of a number of activities, including (but not limited to):

- Monitoring turbidity
- Placement of stone along the sheet pile wall including temporary berm for waler repairs
- Monitoring elevations and slopes of newly placed stone
- Evaluating wall movement during ongoing activities
- Repairing and replacing failed wale components
- Evaluating stresses on tie-rods

The contractor shall be responsible for determining the means and methods by which to complete the work, including the order of activities. The full list of required submittals and the plans and specifications for the repairs and stone placement are provided in Appendix A.

## **5 Closing**

This document provides the technical details and specifications to complete the required repairs to the sheet pile wall at the Site. Should you have any questions or comments regarding the contents of this document, don't hesitate to contact me.

Joseph Vitale, PE

## **Appendix A**

### **Technical Specifications and Design Drawings Sheet Pile Wall Repair Metal Bank Superfund Site**



[illegible][illegible]

TABLE 1. *Mean (SD) age, sex, height, weight, and body mass index (BMI) of the 100 children in the study. The children were recruited at 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.*

1. ALL VARIATIONS ARE REFERENCED TO THE 2010 U.S. AMERICAN VERTICAL DITCH OF 1000 (9440) (B).
2. BASE PLANS AND ELEVATIONS ARE DEVELOPED FROM
- 2.1 "AUGUST TURNPIKE OF THE BACKS AUGUST 11, 2009 BY THE H&H ASSOCIATES, INC. DATED 8/14/2009
- 2.2 "WATERING NOT BY H&H ASSOCIATES, INC. DATED 2/29/2015
3. "HILLSIDE WALL SECTION BY AMEC EARTH & ENVIRONMENTAL, INC. DATED 9/16/2002.

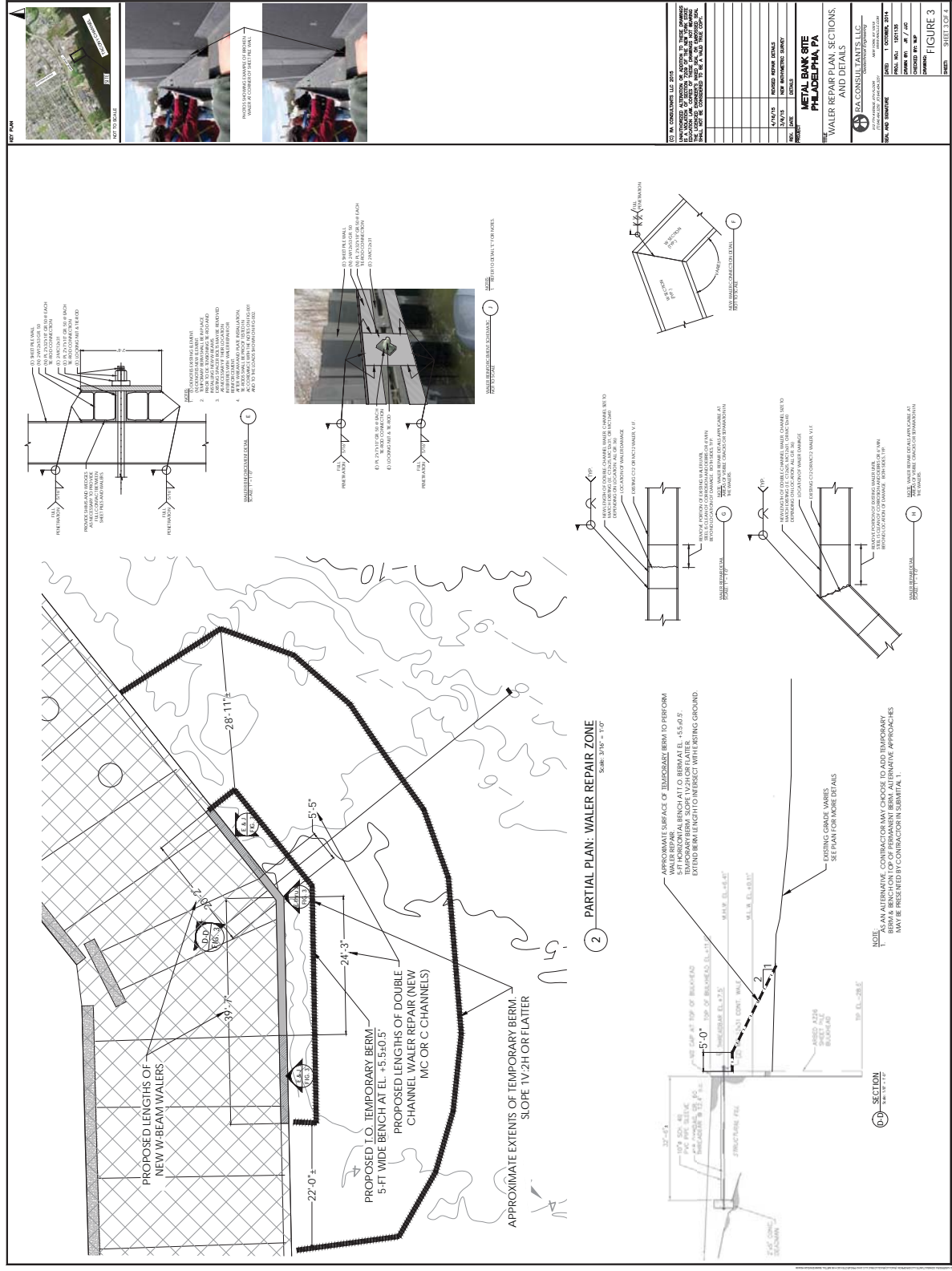
FIGURE 1 - CIPHERAL NOTES

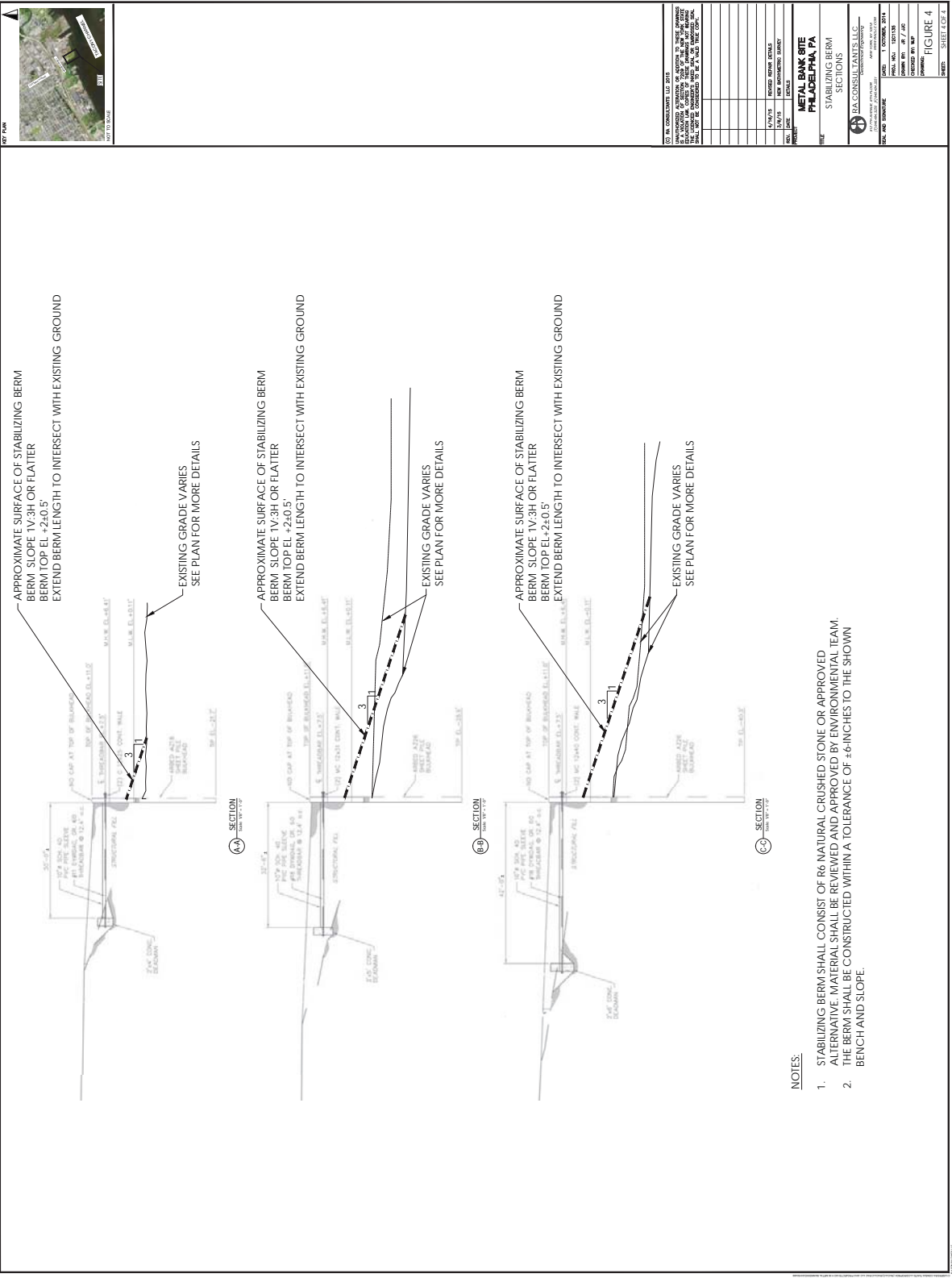
FIGURE 4  
SAMPLING BERN SECTIONS

TABLE OF RECORDS TO SUBMITTALS  
THE FOLLOWING SUBMITTALS ARE REQUIRED FOR THE SUBMITTALS

[illegible]







NOTES:

1. STABILIZING BERM SHALL CONSIST OF R6 NATURAL CRUSHED STONE OR APPROVED ALTERNATIVE. MATERIAL SHALL BE REVIEWED AND APPROVED BY ENVIRONMENTAL TEAM.
2. THE BERM SHALL BE CONSTRUCTED WITHIN A TOLERANCE OF +6-INCHES TO THE SHOWN BENCH AND SLOPE.

SEE PLAN FOR CONSTRUCTION OF BERM

APPROXIMATE SURFACE OF STABILIZING BERM  
BERM TOP EL +2.0±0.5  
EXTEND BERM LENGTH TO INTERSECT WITH EXISTING GROUND

APPROXIMATE SURFACE OF STABILIZING BERM  
BERM TOP EL +2.0±0.5  
EXTEND BERM LENGTH TO INTERSECT WITH EXISTING GROUND

EXISTING GRADE VARIES  
SEE PLAN FOR MORE DETAILS

APPROXIMATE SURFACE OF STABILIZING BERM  
BERM TOP EL +2.0±0.5  
EXTEND BERM LENGTH TO INTERSECT WITH EXISTING GROUND

EXISTING GRADE VARIES  
SEE PLAN FOR MORE DETAILS

APPROXIMATE SURFACE OF STABILIZING BERM  
BERM TOP EL +2.0±0.5  
EXTEND BERM LENGTH TO INTERSECT WITH EXISTING GROUND

EXISTING GRADE VARIES  
SEE PLAN FOR MORE DETAILS

SEE PLAN FOR CONSTRUCTION OF BERM

APPROXIMATE SURFACE OF STABILIZING BERM  
BERM TOP EL +2.0±0.5  
EXTEND BERM LENGTH TO INTERSECT WITH EXISTING GROUND

APPROXIMATE SURFACE OF STABILIZING BERM  
BERM TOP EL +2.0±0.5  
EXTEND BERM LENGTH TO INTERSECT WITH EXISTING GROUND

EXISTING GRADE VARIES  
SEE PLAN FOR MORE DETAILS

SEE PLAN FOR CONSTRUCTION OF BERM

APPROXIMATE SURFACE OF STABILIZING BERM  
BERM TOP EL +2.0±0.5  
EXTEND BERM LENGTH TO INTERSECT WITH EXISTING GROUND

APPROXIMATE SURFACE OF STABILIZING BERM  
BERM TOP EL +2.0±0.5  
EXTEND BERM LENGTH TO INTERSECT WITH EXISTING GROUND

EXISTING GRADE VARIES  
SEE PLAN FOR MORE DETAILS

SEE PLAN FOR CONSTRUCTION OF BERM

APPROXIMATE SURFACE OF STABILIZING BERM  
BERM TOP EL +2.0±0.5  
EXTEND BERM LENGTH TO INTERSECT WITH EXISTING GROUND

APPROXIMATE SURFACE OF STABILIZING BERM  
BERM TOP EL +2.0±0.5  
EXTEND BERM LENGTH TO INTERSECT WITH EXISTING GROUND

EXISTING GRADE VARIES  
SEE PLAN FOR MORE DETAILS

SEE PLAN FOR CONSTRUCTION OF BERM

APPROXIMATE SURFACE OF STABILIZING BERM  
BERM TOP EL +2.0±0.5  
EXTEND BERM LENGTH TO INTERSECT WITH EXISTING GROUND

APPROXIMATE SURFACE OF STABILIZING BERM  
BERM TOP EL +2.0±0.5  
EXTEND BERM LENGTH TO INTERSECT WITH EXISTING GROUND

EXISTING GRADE VARIES  
SEE PLAN FOR MORE DETAILS